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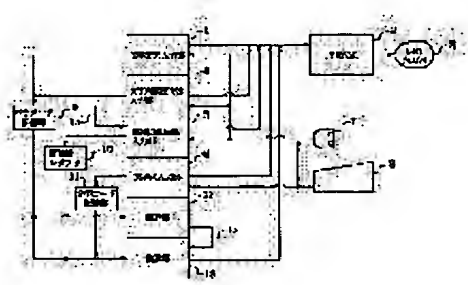
(54) CHARACTER PROCESSOR AND METHOD THEREFOR

(57)Abstract:
PROBLEM TO BE SOLVED: To enable an operator to confirm the kind of the deformation to be applied on characters by providing the processor with means for display the deformed characters based on the character deformation information assigned by a deformation defining screen in the prescribed region of this deformation defining screen.



SOLUTION: A pointing device 7 commonly serving to be a character deformation assigning mans, development method assigning means and coordinate value inputting means commands the deformation relating to the respective characters of the character strings inputted from a keyboard 8 by assigning the desired character deformation in the character deformation information (long type, plane type and slant type) displayed on the character deformation assigning screen that a character deformation input section 1 displays on a CRT display 3.
This pointing device 7 assigns the development method relating to the respective characters of the character strings inputted from the keyboard 8 by assigning the desired character string development method in the development method (horizontal, perpendicular, slant, etc.) displayed on the character strin development method assigning screen that a character string development method input section 4 displa on the CRT display 3.

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CLAIMS

[Claim(s)]

[Claim 1] Character-manipulation equipment characterized by having the means on which the deformation definition screen for specifying character deformation information is displayed, and a means to display on the predetermined field of the aforementioned deformation definition screen the sample of a deformation character based on the character deformation information specified on the aforementioned deformation definition screen.

[Claim 2] The aforementioned character deformation information is character-manipulation equipment according to claim 1 characterized by being a long object and **** information, mirror image information, italic information, shadow information, and middle-coat information.

[Claim 3] Character-manipulation equipment according to claim 1 characterized by having the means on which the character in which deformation based on the

aforementioned deformation alphabetic information was given to the character inputted by input means to input a character, and the aforementioned input means, and deformation was given is displayed.

[Claim 4] The character-manipulation method characterized by having the step on which the deformation definition screen for specifying character deformation information is displayed, and the step which displays on the predetermined field of the aforementioned deformation definition screen the sample of a deformation character based on the character deformation information specified on the aforementioned deformation definition screen.

[Claim 5] The aforementioned character deformation information is the character-manipulation method according to claim 4 characterized by being a long object and **** information, mirror image information, italic information, shadow information, and middle-coat information.

[Claim 6] The character-manipulation method according to claim 4 characterized by having the step on which the character in which deformation based on the aforementioned deformation alphabetic information was given to the character inputted by the input step which inputs a character, and the aforementioned input step, and deformation was given is displayed.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the character-manipulation equipment and the method of displaying the sample of a deformation character based on the specified deformation information.

[0002]

[Description of the Prior Art] In conventional character-manipulation equipment, for example, a word processor etc. The font data (generally stored as dot data) built in ROM of a character generator It receives horizontally, expands or reduces to x times (1, 1.5, 2 and 4, 1-/double precision, etc.) and a perpendicular direction by y times (1, 1.5, 2 and 4, 1-/double precision, etc.), and the equipment displayed or printed out from the position of the cursor currently displayed on the drop is proposed.

Reading claim 1.

[0003] Moreover, in photocomposition input system, the model which can specify rotation of a long object / ****, italic, and a character etc. is proposed about the discrete

character deformation in the inputted character string, and it is constituted by the expansion method of a character string so that horizontal and vertical ****, a slanting group, a periphery group, etc. can be performed.

[0004]

[Problem(s) to be Solved by the Invention] However, in the former character-manipulation equipment, since built-in font data is generally stored as dot data, the output-statement character quality after deformation operation deteriorates remarkably. Moreover, there was a limit of being limited to a perpendicular (****) and there was the expansion method of a character string being level (horizontal typesetting) or a trouble that the transcription of the layout of a character string was restricted remarkably.

[0005] Moreover, although rotation of a long object / ****, italic, and a character etc. can be specified about discrete character deformation in the latter character-manipulation equipment as mentioned above Since it restricts when the expansion method of a character string is horizontal or vertical, and rotation of deformation of a discrete character, i.e., a long object / ****, italic, and a character etc. can only be performed POP which needs a design-element could construct the slanted text in slanting [slight], and could carry out it, or periphery **** of the italic deformation character could not be carried out, and the high character of the design nature which can give an intense impression at a glance could not be outputted, but there was a trouble which can be used only for the limited use.

[0006] Moreover, unless it actually outputted what deformation is given to a character using the character deformation information specified, an operator was not able to check.

[0007] In order to solve the above-mentioned technical problem, the purpose of this

invention is to offer the character-manipulation equipment and the method an operator can check what deformation is given to a character using the character deformation information specified.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the character-manipulation equipment of this invention is characterized by to have the means on which the deformation definition screen for specifying character deformation information is displayed, and a means to display on the predetermined field of the aforementioned deformation definition screen the sample of a deformation character based on the character deformation information specified on the aforementioned deformation definition screen.

[0009] Moreover, the character-manipulation method of this invention is characterized by having the step on which the deformation definition screen for specifying character deformation information is displayed, and the step which displays on the predetermined field of the aforementioned deformation definition screen the sample of a deformation character based on the character deformation information specified on the aforementioned deformation definition screen.

[0010]

[Embodiments of the Invention] Drawing 1 is a block diagram explaining the composition of the character-manipulation equipment in which the form of 1 implementation of this invention is shown, and 1 is the character deformation input section and displays the character deformation appointed screen (refer to drawing 3) on CRT display 3 through VRAM2.4 is the character string expansion method input section,

and displays the character string expansion method appointed screen (refer to drawing 4) on CRT display 3 through VRAM2. 5 is the expansion position-coordinate input section, and displays the form screen (refer to drawing 5) in which the field which develops a character on CRT display 3 through VRAM2 is shown. 6 is the character string input section, and after the expansion position-coordinate input section 5 displays a form screen on CRT display 3, it displays a character screen (refer to drawing 5) on CRT display 3 through VRAM2. 7 is a pointing device, serves both as the character deformation specification means of this invention, an expansion method specification means, and a coordinate-value input means, and orders it the deformation about each character of a character string inputted from a keyboard 8 by specifying the character deformation which considers as a request among the character deformation information (a long object, ****, italic, etc.) displayed on the character deformation appointed screen which the character deformation input section 1 displayed on CRT display 3. Moreover, a pointing device 7 orders it the expansion method about each character of a character string inputted from a keyboard 8 by specifying the character string expansion method considered as a request among the expansion methods (level, a perpendicular, slant, periphery) displayed on the character string expansion method appointed screen which the character string expansion method input section 4 displayed on CRT display 3. Furthermore, a pointing device 7 directs an expansion position coordinate (for example, two arbitrary points or three points) on the form screen which the expansion position-coordinate input section 5 displayed on CRT display 3. 9 is the parameter storage section and stores temporarily character deformation information, expansion information, etc. which were directed by the pointing device 7. 10 is a coordinate-value register and stores

temporarily the expansion position coordinate (an expansion starting position coordinate, expansion end coordinate) directed to the pointing device 7. 11 is the character code storage section and memorizes the code information corresponding to the character string inputted from a keyboard 8. 12 is the operation part used as the 1st operation means of this invention, calculates the deformation character-position coordinate corresponding to each character of a character string inputted from a keyboard 8 based on the character deformation information memorized by the parameter storage section 9 and sends out the deformation character whole company label which calculated to the operation part 13 which serves as the 2nd operation means of this invention through a line L2. As opposed to the deformation character-position coordinate to which operation part 13 is sent out from operation part 12 Coordinate transformation for developing a deformation character string on the periphery which passes along three points which are determined based on the expansion position-coordinate value stored in the character string expansion method and the coordinate-value register 10 which are memorized by the parameter storage section 9, and which receive horizontally and have arbitrary angles is performed. Each character of a deformation character string is developed to the address on VRAM2 corresponding to the changed coordinate position. In addition, the character string expansion method input section 4 is the character string expansion method appointed screen with a line at CRT display 3, and when a perpendicular or a horizontal is specified, L1 inputs into the expansion position-coordinate input section 5 the information which makes in agreement an x-coordinate or a y-coordinate value among the coordinates of two points directed by the pointing device 7, and makes in agreement compulsorily x or the y-coordinate directed by the pointing device 7.

[0011] Drawing 2 is a system configuration view explaining the character-manipulation system which has character-manipulation equipment shown in drawing 1 , and has given the same sign to the same thing as drawing 1 .

[0012] In this drawing, 21 is a microcomputer for system controls, it consisted of MPU21a, internal-memory (ROM, RAM) 21b, floppy disk 21C [used as external memory], cartridge 21d, and disk 21e etc., MPU21a served as operation part 12 and 13, and internal-memory 21b serves both as the parameter storage section 9, the coordinate-value register 10, and the character code storage section 11. 22 is the output section and consists of high speed printer 22a which carries out image record on record material based on electrical-signal-ized information, such as a laser beam printer, interface-circuitry 22b, etc. 23 is image memory, the image information developed by VRAM2 can be memorized, and image information is read when the output section 22 accesses this image memory 23. 24 is BMU and controls rotation of image data, and movement.

[0013] Next, deformation character string output operation by this invention is explained, referring to drawing 3 -6.

[0014] Drawing 3 -6 are a ** type view explaining deformation character string output directions operation by this invention, and they have given the same sign to the same thing as drawing 1 .

[0015] Drawing 3 is a character deformation screen, when the "character kind" on Edit menu 31 is directed with a pointing device 7, the state where the deformation definition 32 was displayed in the multi-window is shown, and a "character kind" is defined from a long object, ****, mirror image reversal, italic, a shadow, a middle coat, etc. It is in the state where a long object and italic were directed by the pointing device 7, the % is "50"

and the specification input of +5 was carried out for the direction of slant in x directions by the keyboard 8 in this example of a display. In addition, in this example, +15 degrees is meant in +5.

[0016] When drawing 4 is the character string expansion method appointed screen and the "character kind" on Edit menu 31 is directed with a pointing device 7 The state where the character kind table 33 was displayed in the multi-window is shown. on the character kind table 33 The area 34 which specifies the expansion method is formed, the expansion methods, such as "level, a perpendicular", "slant", a "periphery", and "****", are prepared in this example, and the case where a "periphery" was chosen by the pointing device 7 was shown. In addition, when specifying rotation of a character, it can point to character rotation 35 with a pointing device 7, and the character string inputted from a keyboard 8 can be rotated by inputting a rotation with a keyboard 8 further.

[0017] Drawing 5 is a form screen and a character string input screen, and if the state which serves as an expansion position coordinate from a pointing device 7 where of the expansion starting position coordinate Ps, the expansion end position coordinate Pe, and the periphery specification position coordinate Pq were directed is shown and this expansion starting position coordinate Ps, the expansion end position coordinate Pe, and the periphery specification coordinate Pq are directed by the pointing device 7, as shown in drawing 5 , the area 36 and the input mode area 37 used as a character string input screen will be displayed on CRT display 3. in addition -- this example -- a keyboard 8 -- a character string, for example, "Japanese alphabet, -- writing -- ****** -- putting -- ******,", and "-- leaving -- an intermediary and what -- the case where" of **** is inputted is displayed

[0018] the character strings 38 and 39 (it leaves "Japanese alphabet -- writing -- ****** -- putting -- ******" and "-- with an intermediary) which drawing 6 is the deformation character string display screen, and were inputted on the character string input screen What ****" by the expansion method specified on the character string expansion method appointed screen, i.e., a "periphery" And the state where the character string which deformed based on the character deformation information (a long object, italic) specified on the character deformation screen was displayed based on the expansion starting position coordinate Ps, the expansion end position coordinate Pe, and the periphery specification position coordinate Pq is shown.

[0019] First, the character deformation screen shown in drawing 3 is displayed on CRT display 3. If it points to the character deformation information considered as a request out of the deformation definition 32 with a pointing device 7, for example, a long object, and italic, the % is further inputted as "50" with a keyboard 8 and +5 is inputted at the amount of italic, i.e., x directions While deformation character 32a is displayed on the space of the deformation definition 32, the character deformation input section 1 writes each inputted parameter in the parameter storage section 9. If a "periphery" is directed for the expansion method used as the expansion information for which the character string expansion method appointed screen shown in drawing 4 is displayed on CRT display 3, operates a pointing device 7, and is established in the area 34 in the character kind table 33 after this writing is completed, the character string expansion method input section 4 will write the expansion method "a periphery" in the parameter storage section 9. If this writing considers as an end, the form screen and character string input screen which were shown in drawing 5 will be displayed, and the expansion value coordinate specification

by the pointing device 7 and the character string input by the keyboard 8 will be stood by. the expansion starting position coordinate Ps, the expansion end position coordinate Pe, and the periphery specification position coordinate Pq which turn into an expansion position coordinate over the character string inputted by the pointing device 7 from a keyboard 8 here -- pointing -- a keyboard 8 -- a character string, for example, "Japanese alphabet, -- writing -- ****** -- putting -- ******" and "-- leaving -- an intermediary and what --" of **** is displayed on the area 36 of CRT display 3 subsequently -- while the expansion position-coordinate input section 5 writes the expansion starting position coordinate Ps, the settled expansion end position coordinate Pe, and the settled periphery specification position coordinate Pq in the coordinate-value register 10 -- the character string input section 6 -- the character code storage section 11 -- receiving -- "Japanese alphabet -- writing -- ****** -- putting -- ******" and "-- leaving -- an intermediary and what -- the code information corresponding to" of **** is written in

[0020] On the other hand, in operation part 12, a deformation character-position coordinate is calculated from the character deformation information memorized by the parameter storage section 9, for example, a long object, italic, and the amount of italic.

[0021] In addition, each alphabetic data consists of arrays which make the profile portion of a character picture cardinal points i, and one character is defined in this example by the coordinate value (xi, yi) of the cardinal points. It corrects and i is set to zero to n-1. $i = 0 \sim n-1$

[0022] Then, the deformation character value coordinate value (xi, Yi) to a coordinate value (xi, xy) is calculated by the ****** (1) formula.

[0023]

[External Character 1]

$$\left.\begin{aligned} X_i &= a_1 * x_i + b_1 * y_i + c_1 \\ y_i &= a_2 * x_i + b_2 * y_i + c_2 \end{aligned}\right\} 1$$

[0024] However, the parameters a1, a2, b1, b2, c1, and c2 in ****** (1) formula are determined by the flow chart shown in drawing 7 based on the numeric value chosen or inputted in the deformation definition 32 displayed on the character deformation screen shown in drawing 3 .

[0025] Next, parameter setup operation by this invention is explained, referring to drawing 7 .

[0026] Drawing 7 is a flow chart explaining parameter setup operation by this invention. In addition, (1) - (9) shows each step.

[0027] In "0" and a parameter b1, "0" is set to "0", a parameter b2 "1", and a parameter c1, and "0" is set to a parameter c2 to a parameter a1 at "1" and a parameter a2, respectively (1). Thereby, initial setting is completed. Operation part 12 judges whether long object specification is made with reference to the parameter storage section 9. Subsequently, (2), If it will progress after a step (4) if it becomes NO, and it becomes YES, while setting the value which multiplied the parameter a1 set as the parameter a1 at the step (1) by rx1 (a1=a1*rx1) While setting the value which multiplied the parameter b1 set as the parameter b1 at the step (1) by rx1 (b1=b1*rx1), the value which multiplied the parameter c1 set as the parameter c1 at the step (1) by rx1 is set (3). (c1=c1*rx1) Operation part 12 judges whether long object specification is made with reference to the parameter storage section 9. Subsequently, (4), If it will progress after a step (6) if it becomes NO, and it becomes YES, while setting the value which multiplied the parameter a2 set as the parameter a2 at the step (1) by ry1 (a2=a2*ry1) While setting the

value which multiplied the parameter b2 set as the parameter b2 at the step (1) by rx1 (b2=b2*rx1), the position which multiplied the parameter c2 set as the parameter c2 at the step (1) by ry1 is set (5). (c2=c2*rx1) Operation part 12 judges whether the x direction italic specification is made with reference to the parameter storage section 9. Subsequently, (6), If it becomes NO, it will progress after a step (8). While setting a set (a1=a1+a2*rx2), the value adding the value which multiplied by rx2 to a2 set as the parameter a1 set up at the step (1) or the step (3) when becoming YES at the step (1) or the step (5) While setting a set (b1=b1+b2*rx2), the value adding the value which multiplied by rx2 to b2 set as the parameter b1 set up at the step (1) or the step (3) at the step (1) or the step (5) A set (c1=c1+c2*rx2) is set for the value adding the value which multiplied by rx2 to c2 set as the parameter c1 set up at the step (1) or the step (3) at the step (1) or the step (5) (7). Operation part 12 judges whether the direction italic specification of y is made with reference to the parameter storage section 9. Subsequently, (8), In the parameter a2 set up at the step (1) or the step (5) when ending control when becoming NO, and becoming YES, a step (1), While setting a set (a2=a2+a1*rx2), the value adding the value which multiplied by ry2 to a1 set up by (3) or (7) In the parameter b2 set up at the step (1) or the step (5), a step (1), While setting a set (b2=b2+b1*ry2), the value adding the value which multiplied by ry2 to b1 set up by (3) or (7) A set (c2=c2+c1*ry2) is set for the value adding the value which multiplied by ry2 to c1 set as the parameter c2 set up at the step (1) or the step (5) by the step (1), (3) or, and (7), and (9) and control are ended.

[0028] The above rx1, rY1, rx2, and ry2 is the deformation information beforehand memorized by the parameter storage section 9. in addition, the deformation information

rx1 It corresponds to long **** of long object pattern 41a of the basic character pattern 41 shown in drawing 8 (a). The deformation information ry1 corresponds to ****** of **** pattern 42a of the basic character pattern 42 shown in drawing 8 (b). the deformation information rx2 It corresponds to the tangent value (tan (theta x)) at the time of setting to theta x the x direction italic angle of x direction italic pattern 43a of a basic character pattern 43 shown in drawing 8 (c). the deformation information ry2 It corresponds to the tangent value (tanthetay) at the time of setting to thetay the direction italic angle of y of direction italic pattern of y 44a of a basic character pattern 44 shown in drawing 8 (d).

[0029] Thus, directed the obtained deformation character value coordinate value (xi, Yi) on the character string expansion method appointed screen shown in drawing 4 . In this example, on the form screen and character string input screen which were shown by "slant" (stored in the parameter storage section 9), and drawing 5 , with a pointing device 7 It calculates so that operation part 13 may mention a deformation character string expansion coordinate value later based on the expansion starting position coordinate Ps, the expansion end position coordinate Pe, and the periphery specification position coordinate Pq which were directed.

[0030] Drawing 9 (a) - (c) is a ** type view explaining deformation character string expansion coordinate-value operation operation by the operation part 13 shown in drawing 1 . Drawing 9 (a) shows the operation which asks for the main coordinate O (xc, yc) radius r of the periphery concerned, and the start angle sd of the character expansion on the periphery from three coordinate values Ps (xs, ys), Pe (xe, ye), and Pq (xq, yq) stored in the coordinate-value register 10. namely, the main coordinate Oc (xc, yc) of a

periphery -- two segments -- it asks easily as an intersection of perpendicular 2 bisectrix of PsPq and PePq -- having -- being appropriate -- alike -- [0031]

[External Character 2]

It comes out, and it is and the start angle sd is called for from sd=atan (ys-yc) (/(xs-xc)). It is the inverse trigonometric function which asks for the angle to which atan ( ) makes a tangent value the specified value here.

[0032] All angle of rotation makes the datum line the segment extended in the x positive directions (horizontal drawing) on the basis of a rotational center, and expresses it with the counterclockwise angle here.

[0033] The processing about the i-th character in the character string which consists of n pieces stored in the character code storage section 11 of drawing 1 after that is generalized and explained.

[0034] In the case of the character (i= 1) of a character string head, they are main angle tdi=sd in drawing 9 (b), and position-coordinate Moi(xmi, ymi) =Ps (xs, yx) first.

[0035] Next, it asks for the character width of face Wi of an applicable character. Drawing 9 (c) is drawing showing the operation which asks for the above-mentioned operation coefficients a1, b1, and c1 and the character width of face Wi of the applicable character called for by operation part 12 using a2, b2, and c2. That is, the coordinate value which specifies the character width of face before exchange is calculated in Noi (0 0) and N1i (w, 0), then Wi=a1*w.

[0036] thetai in drawing 9 (b) is required angle of rotation, when developing an

applicable character from the predetermined position Moi on a periphery.

[0037] In the case of an initial character (i= 1), they are Moi(xmi, ymi) =Ps (xs, ys) and tdi=sd like the above-mentioned.

[0038] At this time, angle-of-rotation thetai is called for from thetai=tdi- (phi i+pi / 2).

[0039] This formula is realized when tdi has the value of what angle. The main angle of a periphery is got blocked here 1/2, and phii is phii=a. It is sin (Wi/2) (/r), and is a. sin ( ) is an inverse trigonometric function which asks for the angle which makes a sine the given value.

[0040] The final interchange coefficient in the case of developing on a periphery from each value calculated above can be obtained. That is, A1=a1*cos(thetai)-a2*sin (thetai)

B1=b1*cos(thetai)-b2*sin (thetai)

C1=c1*cos(thetai)-c2*sin(thetai)+xmiA2=a1*sin(thetai)+a2*cos (thetai)

B-2=b1*sin(thetai)+b2*cos (thetai)

C2=c1*sin(thetai)+c2*cos(thetai)+ymi[0041] However, sin ( ) and cos ( ) are trigonometric functions which calculate the sine value and cosine value over the angle given respectively.

[0042] Subsequently, the deformation variable over the discrete character in the character string inputted from the keyboard 8 based on the flow chart shown in drawing 10 Discrete character data are changed into the profile coordinate position (Xi, Yi) (however, i= 0 to n-1) of the character of the discrete character developed on the final character string by calculating to the cardinal-points coordinate value (xi, yi) (however, i= 0 to n-1) of the profile portion of the character picture which becomes origin.

[0043] Drawing 10 is a flow chart explaining the profile coordinate position operation

procedure by this invention. In addition, (1) - (4) shows each step.

[0044] First, "0" is set to Variable i and the profile coordinate positions Xi and Yi are calculated based on a ****** (4) formula (2). Subsequently, "1" is incremented to Variable i (3). Subsequently, it judges whether Variable i is smaller than the main mark n of the profile portion of the picture of each character, and returns to (4) YES oak ** step (2), and control will be ended if it becomes NO.

[0045]

[External Character 3]

[0046] Thus, the character string inputted from the keyboard 8 based on the obtained profile coordinate positions Xi and Yi is developed by VRAM2, and it comes indicate by expansion on the character strings 38 and 39 which deformed on CRT display 3, i.e., the periphery which it is [periphery] a long object and has the character strings 38 and 39 of italic supposed.

[0047] It is related with the character-position coordinate Moi (xmi, ymi) of the character after the 2nd character (i> 1), and angle-of-rotation thetai, and a gap can also be determined using the result of an operation about the last character.

[0048] That is, last transform coefficient A1i-1 to the last character, B1i-1, C1i-1 and A2i-1, B-2 i-1, C2i-1, character width-of-face wi-1 before conversion of the last character, then the i-th character-position coordinate Moi (xmi, ymi) are M1i-1. That is, it is xmi=A1i-1*wi-1+xmi-1 ymi=A2i-1*wi-1+ymi-1, and i-th character rotation angle thetai should just apply phii-1, then tdi which becomes tdi=tdi-1-2*phii-1 to the above-

mentioned formula for one half of the main angles of the last character like drawing 9 (b).

[0049] The character expansion operation of this invention can be processed by performing the above repeatedly, as the discrete character in a character string is shown in the flow chart of drawing 11 .

[0050] Although the gestalt of the above-mentioned implementation explained the case of developing a deformation character string between terminal points from the starting point of the periphery determined by three points directed by the pointing device 7, developing a deformation character string only to the arbitrary sections between terminal points from the starting point of the periphery determined by three points directed to a pointing device 7 can apply this invention, and attain a display or the output of it in a character string with a design effect high thereby very.

[0051] Moreover, although the gestalt of the above-mentioned implementation explained the case where a deformation character string was displayed on CRT display 3 through VRAM2, it is also possible to consider the deformation character string displayed on CRT display 3 as an image, and to carry out a picture output from high speed printer 22a, by developing the displayed deformation character string to the image memory 23 shown in drawing 2 .

[0052]

[Effect of the Invention] As explained in full detail above, according to this invention, an operator can check what deformation is given to a character using the character deformation information specified.

[Translation done.]